IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Serial No. : 10/706,477
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The following is a marked-up version of the amended specification for the 312 Amendment after Allowance, showing the changes to ths specification.

IN THE SPECIFICATION:

In paragraph claiming priority on page 2.

This patent application claims priority from Provisional ~~Applicatio~~ Application 60/424,544 filed on November 7, 2002, by the University of Pittsburgh.

In paragraph 0037 on page 15

[0037] Fig. 3d is an enlarged cross-sectional side plan view of the microvalve in the closed ~~position ition~~ position;

In paragraph 0042 on page 16.

[0042] Fig. 6 is a graph of the effect of PZT and brass layer thickness on trimorph tip ~~defletion~~ deflection.

Paragraph 0044 page 16 which was partially corrected by the amendment of October 28, 2005.

[0044] The microvalve of this invention is shown generally in Figure 3a at **10** in spaced apart fashion. Figure 3b illustrates the microvalve as an assembled unit. The microvalve comprises ~~and~~ an upper member part **12**, a middle wafer part **14**, an actuator **16** and a lower member part **20**. Flow is generally from left to right through the microvalve. At the heart of the valve is a piezoelectric trimorph actuator **16** that is used to open and shut an axial flow valve via a valve gate **18**. The valve gate can be formed from materials such as, but not limited to stainless steel or silicon Three wafers **12, 14, and 16** are fabricated out of silicon to create the flow channel and

support the actuation mechanism. The middle member part **14** or wafer serves to shield the actuator **16** from the fluid pressure forces. The gate **18** moves through port **22**. Figure 3b shows a dimensioned drawing of the side view of an assembled microvalve. Note that the piezoelectric actuator **16** mechanism extends past the valve body on the left-hand side, permitting the electrical connections to be easily made. The microvalve is shown in the normal open position in Figure 3c. When a voltage is ~~applied~~ applied, the gate moves though port **22** to block the flow as shown in Figure 3d. The units can be readily stacked as shown in Figure 3e. The microvalves can be installed in the cells of a fuel cell such as a PEM.

There are many novel attributes about this valve design, including:

1. Scalable geometry in height (by stacking) and width
2. Axial Flow
3. Relatively Simple
4. Non-thermally activated
5. Low-voltage operation
6. Linear actuator response
7. Possibly linear flow characteristic